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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/635,318	08/06/2003	David Cope	EMI 02.02	8133

27667 7590 01/26/2007

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EXAMINER	
PRESTON, ERIK D	

ART UNIT	PAPER NUMBER
2834	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/26/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/635,318	COPE ET AL.	
	Examiner	Art Unit	
	Erik D. Preston	2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 November 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26,29-31 and 44-46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26,29-31 and 44-46* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 August 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/6/2006 has been entered.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the third lamination stack being substantially orthogonal to the first and second lamination stacks must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering

of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 15,16,23 & 26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no mention in the originally filed disclosure of the third lamination stack being orthogonal to both the first and second lamination stacks. Fig. 8 of the originally filed drawings clearly discloses the third lamination stack (Fig. 8, #41) as being orthogonal to only one lamination stack (Fig. 8, #27).

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-12,15-26 & 44-46 are rejected under 35 U.S.C. 102(e) as being anticipated by Corcoran (US 2002/0053849 supplied by applicant).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

With respect to claims 1,17,24 & 44-46, Corcoran teaches a multiple degree-of-freedom motor comprising: An output shaft (Fig. 21, #702); a stator comprising first (Fig. 21, #714D) and second (Fig. 21, #714B) lamination stacks, each of said stacks having an interior curved surface and a coil (Paragraph 106) wound thereon, said stacks being disposed asymmetrically adjacent said output shaft, whereby each of said lamination stacks in without a complimentary, similarly positioned lamination stack on an opposing side of said output shaft (the first and second stacks do not functionally compliment each other, nor are they similarly positioned); and a rotor (Fig. 21, #704) fixed to said output shaft and movably supported adjacent said stator with an air gap disposed between said rotor and said stator, said rotor including at least one magnet (Paragraph 107) disposed thereon and being movable along said first said interior curved surface of said stacks in directions defining at least first and second degrees of freedom; wherein energization of the coil of said first stack establishes a first magnetic field to urge said output shaft/rotor to rotate both clockwise and counter-clockwise in a

first plane, and wherein energization of the coil of said second stack establishes a second magnetic field to urge said output shaft/rotor to rotate both clockwise and counter-clockwise in a second plane substantially orthogonal to the first plane (as seen, for example in Fig. 21).

With respect to claims 2 & 18, Corcoran teaches the motor of claims 1 & 17, wherein said first degree of freedom is substantially perpendicular to a longitudinal axis of wires of one of said coils associated with the first degree of freedom, and said second degree of freedom is substantially perpendicular to a longitudinal axis of wires of the other of said coils (as seen in Figs. 21 & 22).

With respect to claim 3, Corcoran teaches the motor of claim 1, wherein said interior curved surface substantially defines a portion of a sphere (as seen in Fig. 21).

With respect to claim 4, Corcoran teaches the motor of claim 1, wherein said curved interior surface is uniformly curved (as seen in Fig. 21).

With respect to claim 5, Corcoran teaches the motor of claim 1, wherein said interior curved surface has a plurality of slots formed therein (as seen in Fig. 21).

With respect to claim 6, Corcoran teaches the motor of claim 5, wherein said slots lie on planes substantially parallel to one another.

With respect to claim 7, Corcoran teaches the motor of claim 1, wherein said lamination stack comprises a plurality of laminations radially disposed about a center point, wherein a plane of each lamination extends through said center point (as seen in Figs. 21 & 22).

With respect to claim 8, Corcoran teaches the motor of claim 1, wherein at least one lamination stack has an interior curved surface (the tooth tips) with no slots formed therein.

With respect to claims 9 & 19, Corcoran teaches the motor of claims 1 & 17 wherein at least one said magnet is a permanent magnet.

With respect to claims 10,20 & 25, Corcoran teaches the motor of claims 1,17 & 24, wherein at least one said magnet is faceted (such as is described in Paragraph 82).

With respect to claims 11 & 21, Corcoran teaches the motor of claims 1 & 17, wherein the output shaft is also an input shaft.

With respect to claims 12 & 22, Corcoran teaches the motor of claims 1 & 17, further comprising at least one sensor (of the type as taught in Fig. 7, #64) for detecting movement of said input shaft.

With respect to claims 15,16,23 & 26, Corcoran teaches the motor of claims 1,17 & 24 wherein, said stator further comprises a third lamination stack (Fig. 21, #714A); having an interior curved surface and a coil wound thereon; wherein said third lamination stack is substantially orthogonal to said first and second lamination stacks; wherein said rotor includes at least one magnet disposed thereon and being movable along said interior curved surface of said third lamination stack in a direction defining a third degree of freedom; wherein energization of the coil of said third lamination stack establishes a third magnetic field to urge said output shaft to rotate in a third plane substantially orthogonal to each of said first and second planes (as seen in Figs. 21 & 22).

Claims 1-9,11,12,14,17-19,21,22,24,29,30 & 44-46 are rejected under 35 U.S.C. 102(e) as being anticipated by Moore et al. (US 7061466, previously cited).

With respect to claims 1,17,24,29,30 & 44-46, Moore teaches a multiple degree-of-freedom motor comprising: An output shaft (Fig. 2, #56); a stator comprising first (Fig. 2, #70a) and second (Fig. 2, #70b) stacks, each of said stacks having an interior curved surface facing the rotor and a coil (as seen in Figs. 5a & 5b) wound thereon, wherein the laminations of the first lamination stack and the second lamination stack are substantially parallel to one another (each of the laminations in the first and second stacks are substantially parallel to the other laminations included in their respective stacks) said stacks being disposed asymmetrically adjacent said output shaft; whereby each of said lamination stacks is without a complimentary, similarly positioned lamination stack on an opposite side of said output shaft, and a rotor fixed to said output shaft and movably supported adjacent said stator with an air gap disposed between said rotor and said stator, said rotor including at least one magnet (Fig. 5a, #96a) disposed thereon and being movable along said interior curved surface of said stacks in directions defining at least first and second degrees of freedom; wherein energization of the coil of said first stack establishes a first magnetic field to urge said output shaft/rotor to rotate both clockwise and counter-clockwise in a first plane, and wherein energization of the coil of said second stack establishes a second magnetic field to urge said output shaft/rotor to rotate both clockwise and counter-clockwise in a second plane substantially orthogonal to the first plane (as seen in Fig. 2).

With respect to claims 2 & 18, Moore teaches the motor of claims 1 & 17, wherein said first degree of freedom is substantially perpendicular to a longitudinal axis of wires of one of said coils associated with the first degree of freedom, and said second degree of freedom is substantially perpendicular to a longitudinal axis of wires of the other of said coils (as seen in Fig. 2).

With respect to claim 3, Moore teaches the motor of claim 1, wherein said interior curved surface substantially defines a portion of a sphere (as seen in Figs. 5a & 5b).

With respect to claim 4, Moore teaches the motor of claim 1, wherein said curved interior surface is uniformly curved (as seen in Figs. 5a & 5b).

With respect to claim 5, Moore teaches the motor of claim 1, wherein said interior curved surface has a plurality of slots formed therein (as seen in Figs. 5a & 5b).

With respect to claim 6, Moore teaches the motor of claim 5, wherein said slots lie on planes substantially parallel to one another.

With respect to claim 7, Moore teaches the motor of claim 1, wherein said lamination stack comprises a plurality of laminations radially disposed about a center point (the rotor as seen in Figs. 5a & 5b) wherein a plane of each lamination extends through said center point.

With respect to claim 8, Moore teaches the motor of claim 1, wherein at least one lamination stack has an interior curved surface (the tooth tips) with no slots formed therein.

With respect to claims 9 & 19, Moore teaches the motor of claims 1 & 17 wherein at least one said magnet is a permanent magnet.

With respect to claims 11 & 21, Moore teaches the motor of claims 1 & 17, wherein the output shaft is also an input shaft.

With respect to claims 12 & 22, Moore teaches the motor of claims 1 & 17, further comprising at least one sensor (Fig. 11, #72) for detecting movement of said input shaft.

With respect to claim 14, Moore teaches the motor of claim 1, further comprising a communication interface for providing input and/or output signals to detect and/or control the position of said output shaft (as seen in Fig. 11).

Claim Rejections - 35 USC § 103

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moore et al. (US 7061466, previously cited). Moore teaches the motor of claim 1, but it does not specifically teach a cooling fan. However, cooling fans for motors were well known at the time of the invention. It would have been obvious to one of ordinary skill in the art at the time of the invention to include a cooling fan in the invention of Moore since it would provide a means for cooling the stator of the motor.

Claims 10,20 & 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moore et al. (US 7061466) further in view of Deeg et al. (DE 19501439 supplied by applicant). Moore teaches the motor of claims 1,17 & 24, but it does not specifically teach that at least one said magnet is faceted. However, Deeg teaches a faceted magnet (as seen in Fig. 1). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the magnets of Moore in view of the faceted magnets of Deeg as merely a substitution of equally well-known rotor magnets, and also

because it has been held that a change in shape is not considered to be patentably distinct if it does not effect the utility of a device (In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966)).

Claims 15,16,23,26 & 31 rejected under 35 U.S.C. 103(a) as being unpatentable over Moore et al. (US 7061466) in view of Rosenberg et al. (US 6437771). Moore teaches the motor of claims 1,17,24 & 29, but it does not teach that said stator further comprises a third lamination stack having an interior curved surface and a coil wound thereon; wherein said rotor includes at least one magnet disposed thereon and being movable along said interior curved surface of said third lamination stack in a direction defining a third degree of freedom; wherein energization of the coil of said third lamination stack establishes a third magnetic field to urge said output shaft to rotate in a third plane substantially orthogonal to each of said first and second planes. However, Rosenberg teaches a force feedback system wherein force can be applied to an output shaft (Fig. 2, #44) in three substantially orthogonal degrees of freedom (Fig. 2, #51-53). It would have been obvious to one of ordinary skill in the art at the time of the invention to include another of the lamination stacks of Moore in the system as taught by Moore in view of the three degrees of freedom as taught by Rosenberg because it provides a means for simulating the tool impacting a body (Rosenberg, Col. 12, Lines 9-19), and it also would have been obvious to one of ordinary skill in the art at the time of the invention to include another of the lamination stacks of Moore in the system as taught by Moore since it has been held that the mere duplication of parts has no patentable significance unless a new and unexpected result is produced (In re Harza, 274 F.2d

669, 124 USPQ 378 (CCPA 1960)). It would also have been obvious to one of ordinary skill in the art at the time of the invention to place this third lamination stack in a position wherein the laminations of the first and second lamination stacks are substantially perpendicular to its laminations (i.e. in a position wherein the laminations of the third lamination stack extend in a radial direction with respect to the output shaft) since it has been held that changing the position of an element of an invention is prima facie obvious in the absence of new or unexpected results (In re Japikse, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950)).

Response to Arguments

Applicant's arguments filed 10/06/2006 have been fully considered but they are not persuasive.

In response to the applicant's arguments that Fig. 8 shows a third lamination stack that is orthogonal to two other lamination stacks. It is noted that the claims do not make mention of the lamination sheets of the stacks, only the stacks themselves. In Fig. 8, #27 & #41 are orthogonally positioned, while #25 & #41 lie on the same plane. It is also noted that nowhere in the originally filed disclosure is there any mention of the explicit arrangement of the laminations that make up the lamination stacks. Fig. 8, #43 is coil, and not a lamination sheet as is stated by the applicant.

In response to the applicant's argument that the lamination stacks of Corcoran are symmetrically disposed, it is noted that, as can be seen in Fig. 21, the laminations stacks are both adjacent to the output shaft, and asymmetrically disposed with respect to said shaft. One of the stacks extends horizontally while the other extends vertically.

In response to the applicant's argument that Moore does not teach a rotor including at least one magnet disposed thereon and being movable along said interior curved surface of said lamination stacks in directions defining at least first and second degrees of freedom. It is noted that all of the integrally formed rotatable portions of Moore define a single rotor that moves in two degrees of freedom. One of the degrees of freedom is defined by the first lamination stack, and the other is defined by the second lamination stack. The claims make no recitation of the each of the one or more magnets being movable in two degrees of freedom along each of the inner curved surfaces of the lamination stacks.

In response to the applicant's argument that Moore does not teach laminated stator cores, it is noted that Oudet et al. US 5,334,893 (incorporated by reference; Moore: Col. 9, Lines 25-27) teaches this limitation in Col. 4, Lines 60-66.

In response to the applicant's argument that the lamination stacks of Moore do not have curved surfaces, it is noted that this limitation is taught in Figs. 5a & 5b. It is also noted that the applicant admits, in the first paragraph of page 14, that Moore teaches an interior curved surface.

In response to the applicant's argument that the interior curved surface of Moore does not define a portion of a sphere. It is noted that the curved surface of Moore clearly defines a circle (Figs. 5a & 5b). A circle is a portion of a sphere.

In response to the applicant's argument that Deeg does not teach faceted magnets, it is noted that Deeg teaches faceted magnets in Figs. 17 & 18.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erik D. Preston whose telephone number is (571)272-8393. The examiner can normally be reached on Monday through Friday 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on (571)272-2044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

01/09/2006

BURTON S. MULLINS
PRIMARY EXAMINER